Amendments to Specification

Please amend paragraph [22] that begins on page 8 and ends on page 9 to read as follows:

The fatigue monitoring algorithm is operable to monitor transition cycles between the fatigue subset ranges of the turbocharger 11. For purposes of the present invention, a transition cycle is monitored increase of the calculated fatigue pressure ratio between fatigue subset ranges. However, it should be appreciated that the transition cycle could be a monitored increase or decrease of any parameter correlated to turbocharger rotational speed. A transition cycle begins when the calculated pressure ratio increases from a fatigue subset range to the adjacent higher fatigue subset range. The calculated pressure ratio cannot skip an adjacent fatigue subset range. For purposes of this description, the lowest fatigue subset range of a transition cycle will be referred to as the starting fatigue subset range (FPR^1 shown in Figure 2). As long as the pressure ratio remains within the same fatigue subset range or increases in fatigue subset ranges, the transition cycle continues. The transition cycle ends when the calculated pressure ratio decreases in fatigue subset ranges. For purposes of this description, the highest fatigue subset range will be referred to as the ending fatigue subset range (FPR^2 shown in Figure 2). A new transition cycle ~~beings~~begins when the pressure ratio again increases. For instance, if the monitored pressure ratio increased from fatigue subset range one to fatigue subset range two, the transition cycle begins. If the pressure ratio then continues to increase from fatigue subset range two to subset range eight, the transition cycle continues. But, if the pressure ratio decreases to fatigue subset range eight back to fatigue subset range seven, the transition cycle is completed.

Please amend paragraph [23] begins on page 9 and ends on page 10 to read as follows:

Referring to Figure 2, there is shown a matrix illustrating the stored data included within the fatigue monitoring algorithm, according to the present invention. The

possible starting fatigue subset ranges ($FPR^1_{(1)-(10)}$) and the possible ending fatigue subset ranges ($FPR^2_{(1)-(10)}$) are listed on the vertical and horizontal axis, respectively. Each box is defined by a ~~staring~~starting fatigue subset range (FPR^1) and an ending fatigue subset range (FPR^2), and thus, represents a transition cycle of a particular size. In the illustrated example, there is a possibility of forty-five different sizes of transition cycles, and thus, there are forty-five open boxes, or storage points. The fatigue monitoring algorithm will count the number of transition cycles within each box. Each of the forty-five sizes of transition cycles includes a particular predetermined fatigue rating. The fatigue rating of the transition cycle depends on the size of the transition between the fatigue subset ranges and the pressure ratios at which the transition cycle is occurring. For instance, a transition cycle from fatigue subset range one ($FPR^1_{(1)}$) to eight ($FPR^2_{(8)}$) will have a higher fatigue rating than a transition cycle from fatigue subset range one ($FPR^1_{(1)}$) to four ($FPR^2_{(4)}$). However, a transition cycle from fatigue subset range seven ($FPR^1_{(7)}$) to fatigue subset range nine ($FPR^2_{(9)}$) will include a higher fatigue rating than will the transition cycle from fatigue subset range five ($FPR^1_{(5)}$) to fatigue subset range seven ($FPR^2_{(7)}$). The product of the fatigue rating and the number of transition cycles within the respective box results in a fatigue stress damage (FS_{a-tt}) caused by that particular size of transition cycles. The fatigues stress damages (FS_{a-tt}) will be stored and updated. The sum of the fatigue stress damage for each particular transition cycle will result in the monitored fatigue of the turbocharger 11.

Please amend paragraph [25] that begins on page 10 and ends on page 11 to read as follows:

The turbocharger life determining algorithm also includes a creep monitoring algorithm being operable to monitor the creep within at least one component of the turbocharger 11. Similar to the fatigue monitoring algorithm, the present invention monitors the creep within the compressor wheel 13 and the turbine wheel 14, although it could monitor the creep within only one of the wheels 13 and 14. The creep monitoring algorithm monitors the creep by monitoring the amount time during which the turbocharger 11 ~~operators~~operates at different combinations of calculated pressure ratio

and sensed compressor and turbine inlet temperature. Similar to the fatigue monitoring algorithm, the calculated pressure ratios are preferably adjusted by the sensed engine speed and sensed compressor inlet temperature. The creep monitoring algorithm will preferably also monitor the compressor inlet temperature and the turbine inlet temperature. Because there is a relationship known in the art between compressor inlet temperature, compressor outlet temperature and the compressor pressure ratio, the creep monitoring algorithm can monitor the compressor outlet temperature by monitoring the pressure ratio and compressor inlet temperature. Further, the turbine inlet temperature can be inferred from the sensed exhaust pressure exiting the engine 16, engine fuel rate, or engine load and manifold pressure. Those skilled in the art will appreciate that many control systems will include exhaust pressure sensors. However, it is preferred that the turbocharger life determining system 10 includes the compressor inlet temperature sensor 24 which can directly sense the compressor inlet temperature and communicate such to the electronic control module 26. In addition, it is preferred that the turbocharger life determining system 10 includes the turbine inlet temperature sensor 24 which can directly sense the turbine inlet temperature and communicate such to the electronic control module 26.

Please amend paragraph [27] that begins on page 11 and ends on page 12 as follows:

Although the pressure ratios at which creep occurs may vary among turbochargers, the onset of creep generally occurs at a calculated pressure ratio of approximately 70% of the maximum possible pressure ratio. Although the inlet temperatures at which creep occurs may vary among turbochargers, the onset of creep generally occurs within the compressor wheel 13 at approximately 20° C and above, and generally occurs within the turbine wheel 14 at approximately 400° C and above. Thus, creep pressure ratio subset range number one may include pressure ratios between 0-70% of the maximum pressure ratio, compressor inlet temperature subset range one may include temperatures below 20° C, and turbine inlet temperature subset range may include temperatures below 400° C. The remaining pressure ratios and temperatures over

the turbocharger operating range can be equally separated into the respective subset ranges two through three. For instance, there are four creep subset ranges. The first will include pressure ratios from 0-70% of the maximum pressure ratio, the second creep subset range will include pressure ratios that are 71-80% of the maximum pressure ratio, the third will include pressure ratios that are 81-90% of the maximum pressure ratio, and the fourth will include pressure ratios that are 91-100%.

Please amend paragraph [35] that begins on page 17 and ends on page 18 to read as follows:

As the turbocharger 11 operates, the compressor inlet pressure sensor 22 and the compressor outlet pressure sensor 23 will periodically sense the pressure of the air flowing into the compressor inlet 18 and the air flowing out of the compressor outlet 19, respectively. The pressures are communicated to the electronic control module 26 via the inlet pressure sensor communication line 27 and the outlet pressure sensor communication line 28. Further, the compressor inlet temperature sensor 24, the turbine inlet temperature sensor 33, and the engine speed sensor 25 will periodically sense the temperature of the air flowing into the compressor inlet 18, into the turbine inlet 20, and the speed of the engine 16, respectively. Although the time interval between which the pressure sensors 22, 23, 24, 25, and 33 sense their respective parameters and communicate such to the electronic control module 26 can vary, it should be appreciated that the time interval should be sufficiently short such that transitions in the sensed parameters can be detected in order to accurately calculate transitions in the estimated turbocharger rotational speed. For instance, in the illustrated example, the time interval is approximately 0.01~~-.05~~0.05 seconds.